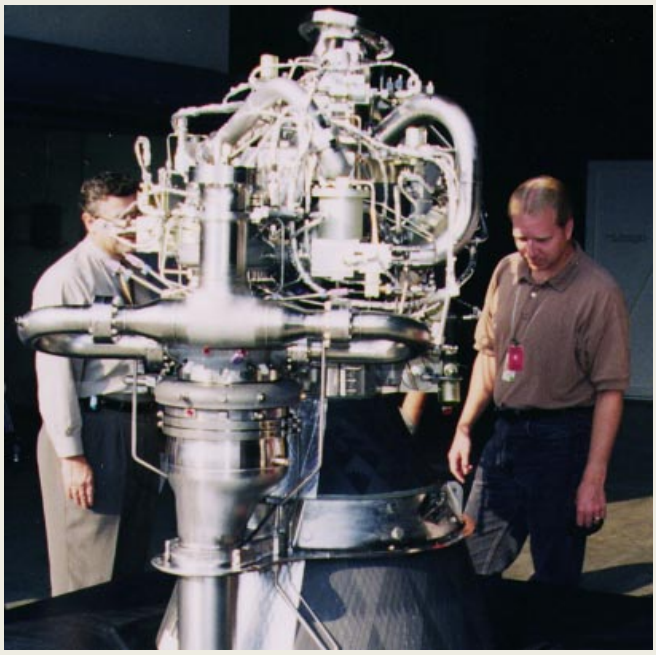
40 MARSHALL STAR

Vol. 38 / Num. 48 | Marshall Space Flight Center | August 12, 1998



NASA photo by Terry Leibold

**Marshall's first Fastrac engine rolls out from assembly at Summa Technologies in Huntsville. The Fastrac engine was shipped last week to Stennis Space Center in Mississippi where it will undergo full-engine tests.**

# On the Fastrac to the Stars

*Assembly of Marshall's First Fastrac Engine Complete*

*by Deana Nunley*

Small companies that typically don't work in the aerospace business and products that weren't made especially for rocket engines have merged to create a new, low-cost engine that could dramatically reduce the cost of getting to space.

Assembly of the first Fastrac engine — only the second space launch engine developed in the United States in the last 25 years — is complete. Designed and developed by Marshall, the Fastrac is a 60,000-pound-thrust engine scheduled to power the X-34 technology demonstrator.

Each Fastrac engine will initially cost approximately $1.2 million — about one-fifth the cost of similar engines. Once the engine is in mass production, that cost is expected to drop to about $750,000.

The engine, fueled by a mixture of kerosene and liquid oxygen, is targeted for launch systems designed to boost payloads weighing up to 500 pounds at a much lower cost than current rockets.

"The Fastrac engine is an elegant, low-cost device that's going to revolutionize space access," said Danny Davis, manager of Marshall's Low Cost Technologies project.

*See **Fastrac** on Page 4*

# Date Announced for First Marshall Town Meeting

Acting Marshall Center Director Carolyn Griner has announced the date for the first of a series of Town Meetings with Center employees.

The first meeting will be held Thursday, Aug. 13, in the cafeteria in building 4610 from 1:30 p.m. to 3:30 p.m. This will be the first of six Town Meetings with each employee invited to attend the meeting that best fits his or her schedule.

Griner said the first six Town Meetings will provide her with the opportunity to present her thoughts on how to revitalize certain aspects of the Center's culture. As part of a second series of meetings, Griner will meet with employees and solicit their opinions.

Dates and locations for the remaining five initial town meetings as well as the feedback sessions will be published in next week's Marshall Star.

Griner used her morning staff meeting with senior managers on Monday to talk about the need to lay the groundwork for cultural changes that she considers vital as the Center faces the new millennium.

*See **Town Meeting** on page 2*

***Through GHCC Research***

# Hurricane Study Results Could Save Lives

*by Kelly McFalls*

With an aim to improve hurricane predictions on the ground, researchers from the Global Hydrology & Climate Center are leading an Atlantic hurricane and tropical storm study.

Results from the study that began last week and continues through Sept. 23 could increase warning time — saving lives and property — and decrease the size of evacuation areas — saving money.

Directed by the Atmospheric Dynamics and Remote Sensing program at NASA Headquarters in Washington D.C., the experiment unites seven NASA centers, other governmental weather researchers and the university community for a coordinated, multi-agency and university Atlantic hurricane and tropical storm study.

"We only know what goes on in the bottom half of a hurricane — from sea level to 27,000 feet," said the study's lead investiga-

*See **Hurricane** on page 5*

## Around Marshall

### Marshall Engineer to be Guest Speaker at U.S. Space & Rocket Center This Afternoon

As part of NASA's 40th Anniversary celebration, the Marshall's Speakers Bureau has coordinated "storytelling" sessions to be held Wednesday afternoons during August at the U.S. Space & Rocket Center.

The 15-minute presentations will be given at 2 and 2:30 p.m. Today's guest speaker will be George Harsh, an aerospace engineer at Marshall and the speaker for Aug. 19 will be Center Historian Mike Wright.

### Center-Wide Emergency Warning System Test Scheduled for 3 p.m. Thursday

The monthly test of the Emergency Warning System at Marshall is scheduled for 3 p.m. Thursday.

This is an audio test only, and employees should not evacuate to protective areas. If severe weather is occurring at this time, the test will be rescheduled to a later date.

Safety coordinators and monitors should send reports of malfunctioning speakers to: AB11/Emergency Preparedness Officer at 544-5187 as soon as possible.

### Cellular Phones to be Reprogrammed for New 256 Area Code Aug. 26 at Bldg. 4752

Arrangements have been made with Bell South Mobility to provide cellular phone area code reprogramming service for Marshall employees, on-site contractors and retirees personal cellular phones.

To get phones reprogrammed, employees should bring their cellular phone to Marshall's Activities Building 4752 Aug. 26 from 9 a.m.-1 p.m.

The deadline for reprogramming to the new 256 area code is Sept. 28. For more information call the NASA Exchange at 544-7564.

### Full Cost Training Scheduled During August And September for Center Employees

Full Cost training is scheduled for 8 a.m.-4:30 p.m. during August and September. Full Cost is a concept tying all Agency costs to major activities.

Employees may register for the eight-hour training via AdminSTAR. Training dates are:

| | |
|---|---|
| Aug. 12 &19 | Bldg. 4200, room G-21 |
| Aug. 26 & Sept. 9 | Sparkman Center, Bldg. 5304, room 4331/33 |
| Sept. 23 | Sparkman Center, Bldg. 5304, room 4353/57 |

For more information about Full Cost training, contact LaVerta McGlathery at 544-7560.

# Town Meeting

*Continued from page 1*

As part of the meeting on Monday, Griner talked about the Center's future and its relationship to Marshall institutional culture including the Center's vision, its leadership, its creativity and its ability to communicate both internally and externally.

"In recent years, we have made strides in these areas through "Project Light," our "Vision to Action" team and other initiatives. These are tools that we will continue to use," Griner said. But she also noted "an even more powerful challenge" confronting the Center. "We need to change our culture to instill an attitude that breeds success."

Griner said the process would take time and include challenges. "However, it is one that is absolutely vital and demands a starting point."

# Fishman Named Senior Scientist in S&E Directorate at Marshall

**Dr. Gerald Fishman**

Dr. Gerald J. Fishman has been appointed to the senior scientific and technical position as senior scientist for Gamma-Ray Astronomy, Space Sciences Laboratory, in the Science and Engineering Directorate at Marshall.

Since joining Marshall as a space scientist in 1974, Fishman's scientific research has and continues to provide scientists with a series of pioneering observations in the field of gamma-ray astronomy and discoveries in high-energy astrophysics, utilizing space-borne and balloon-borne instruments.

Fishman made significant findings concerning background radiation effects in gamma-ray astronomy and the intensity distribution of gamma-ray bursts. Fishman is the principal investigator of the Burst and Transient Source Experiment (BATSE) that was selected in 1978 to fly on the Compton Gamma Ray Observatory, one of NASA's Great Observatories.

# Workers needed for Census 2000

The Department of Commerce has requested help in recruiting employees for temporary appointments for the upcoming Census 2000 initiative.

Positions will be short-term and allow flexible working hours — with most work being done in the evenings and on weekends conducting door-to-door interviews to update addresses and to follow up on households that did not return their census questionnaire. Census taking is not an office job and employees are normally assigned to cover their respective local communities and work out of their homes. Most of the work will last less than 3 months and occurs during the months of March through July 2000. For more information about these job opportunities, contact the Bureau of the Census at 1-888-325-7733.

***At the U.S. Space & Rocket Center***

# Exciting Activities Await Marshall Picnic Guests

*by Carole McLemore and Renee Reynolds*
*Picnic Publicity Committee*

This year's Marshall picnic will celebrate NASA's 40th Anniversary and honor the accomplishments of Center employees and on-site contractors. The picnic, set for 4-9 p.m. Saturday, Aug. 22, at the U.S. Space & Rocket Center, offers an array of exciting activities for all ages.

Be sure to bring a camera, and lawn chairs or blankets. Ice chests, pets, rollerblades and skateboards will not be allowed at the Space & Rocket Center. Parking is only authorized in the Chrysler parking lot located across I-565 from the Space & Rocket Center at Madison Pike and Wynn Drive. A continuous shuttle service between the parking lot and the park will be available.

### Meal Tickets/Passes

If you already have admission passes for the Space & Rocket Center and do not have meal tickets, they can be purchased from Picnic committee members 11 a.m.-1 p.m. today through Aug. 14 in the lobby of Bldg. 4203. Meal ticket sales end Aug. 14. Administrative officers no longer have meal tickets or free passes. Due to the limited availability of free passes, anyone who has passes they won't use should return them to the Picnic Committee members. Passes can be returned the same days and times listed above.

### Entertainment/Activities

Put on your dancing shoes and come out to listen to live music. Two bands, both local favorites, will be featured at this year's picnic. The opening act, Churchstreet, will play top-40 hits 4:30-6 p.m. at the Main Stage. Blues band Microwave Dave and the Nukes are scheduled to take the stage at 6:30 p.m. This band has received international recognition with their number one hit in France "Roadrunner."

In addition to the bands, all of the Space & Rocket Center exhibits, rides, and attractions including Space Shot are available and free to picnic attendees. The IMAX Theater will feature "Mission to Mir" at six different times beginning at 4 p.m. Free tickets for viewing of the IMAX movie will only be available in the theater lobby on picnic day. The theater has a maximum capacity of 288 people.

There will be a variety of activities for kids of all ages including face painting, MoonWalk, Kid's Cosmos, Murphy the Magician, Freedom Rose (the balloon man), Stiltman, costume characters and photo displays.

Families can participate in this year's new picnic event — an educational scavenger hunt. One scavenger hunt card with space-related questions will be provided per family in the IMAX Theater Lobby from 5:30-6:15 p.m. Answers to the questions will be found at the Space & Rocket Center exhibits. Participants have until the 7:30 p.m. deadline to drop completed cards into the box on the table in the theater lobby. Ten winners will be chosen at random and announced during the door prize drawings. Each winner will receive one astronaut beanie, one Space Shuttle beanie, and two tickets to the new Freedom Kid Station in Madison. Kids ages 12 years and under shouldn't forget to get their grab bag filled with goodies at the gate.

At the conclusion of the picnic, Sharon Hancock will sing a patriotic song before the grand finale fireworks display.

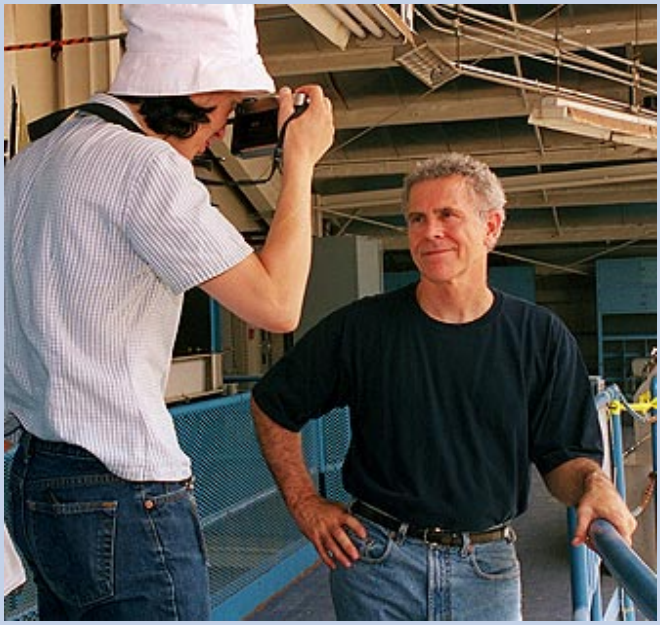
### Special Events/Guests

Acting Center Director Carolyn Griner will lead the Children's Parade set for 4:15 p.m. under the Shuttle display. Six astronauts helping to lead the parade and signing autographs include: Jan Davis, of Huntsville and former Marshall employee who has flown on three missions; Mark Lee; Charlie Precourt; Dominic Gorie; Janet Kavandi; and Franklin Chaing Diaz.

### Door Prizes

A bonus door prize drawing is planned for 6:15 p.m. with additional prize drawings set for 8:15 p.m. at the main stage. Participants must be present to win the door prizes. Prizes include: a bistro set, holiday doll, gas grill, stereo, VCR, 25" color television, cordless phone, camera, microwave and a baker's rack.

More information is at the Picnic Web site at: http://picnic98.msfc.nasa.com.



NASA photo by Emmett Given

***Former Marshall Employee Photographed at Center for Life Magazine Article***

**Homer Hickam, former Marshall employee, poses for Life Magazine photographer Randy Berez. Hickam has written a book entitled "The Rocket Boys" based on his childhood interest in rocketry. Universal Studios has developed a screen play based on the book.**

***Through the SHARP Program at Marshall***

# Students Experience Working In Space Research

*by Joy Carter*

Thirty-two Madison County high school students are working in NASA's 1998 Summer High School Apprenticeship Research Program (SHARP) at Marshall.

SHARP is an intensive science and engineering apprenticeship program designed to increase, strengthen and diversify the pool of students for mathematics, science and engineering college majors and careers.

SHARP was initiated in 1980 and is sponsored by NASA's Education Division and participating NASA field installations. Since 1980, approximately 2,300 SHARP apprentices have participated in the program and more than 2,600 NASA employees have served as SHARP mentors. Studies from the SHARP Participant Database System reveal that 80 percent of former SHARP apprentices pursue majors in mathematics, engineering, science, or technology.

Each year SHARP offers a select group of high school students the opportunity to participate in the program for eight weeks during the summer. Once the students are selected, they are assigned to work with a NASA mentor in a specific area of science or technology.

SHARP apprentices are selected by NASA and Modern Technology Systems, Inc., from an applicant pool of more than 1,300 talented students for apprenticeships at nine NASA field installations throughout the United States. This year the program began on June 1 and will continue through Aug. 14. During the apprenticeship, students have the opportunity to conduct meaningful research and participate in a variety of educational and professional activities.

Area students who have been working with Marshall include: Annukka Antar, Huntsville; Adam Bailey, New Hope; Michael Burris, Nikeya Carter, Jerry Chen, Ryan Daffin, and Raghava Dasarathy, Huntsville; Jekia Doss, Toney; Erica Edwards and Danita Fowler, Huntsville; Hilliary Hardin, Harvest; Marjorie Holden, Erica Ignont and Charles Lu, Huntsville; Renee Makowski, Madison; Adam Maycock, Annell Matthews, Meredith McCarthy, Delwin Merchant, Lakisha Moore, and Christopher Robinson, Huntsville; Mellissa Robinson, Hazel Green, Clifford Schlecht, Meridianville; Laura Stepko, Madison; Rajeeni Thomas, Meridianville; Shanika Thompson, Jeremy Tibbs, Caroline Tse, Naveen Vennam, Norton Webb Jr., Allen Whitt, Huntsville; and Justin Wilson, Harvest.

NASA photo by Danny Reeves

**From left, Jim Pruitt, Marshall Education Programs Office director joins Frank Owen, NASA Headquarters' Education Division director, in thanking Ida Crawford, Summer High School Apprenticeship Research Program coordinator/teacher at Lee High School.**

# Fastrac

*Continued from page 1*

"NASA avoided the usual expense of highly specialized, labor-intensive manufacturing processes by simplifying the engine design. This allows the use of small U.S. companies not traditionally associated with the aerospace industry to fabricate the hardware. It also allows use of some commercial, off-the-shelf parts instead of complex aerospace parts."

Building the Fastrac is relatively easy because it has significantly fewer parts than other American rocket engines. For instance, the Fastrac has a three-piece injector — a sharp contrast from typical injectors with hundreds of pieces.

While developing a new rocket engine has traditionally taken as long as 10 years, Fastrac's fast track measured just two-and-one-half years. This marks the first time Marshall has developed a rocket engine in-house.

A unique feature of the Fastrac program is that NASA is generating technology that can be spread all across the aerospace industry," said Davis. "Because we're doing it in-house with our engineering force, there are no industry proprietary rights to the data. This excites us because we want all of our technology that's paid for by taxpayers to have a very high impact on the aerospace industry."

Component testing continues at Marshall with Fastrac turbopump tests under way. The Fastrac was shipped last week to Stennis Space Center, Miss., for full-engine tests.

NASA's industry partners on the Fastrac project include: Allied Signal Inc. of Tempe, Ariz.; Barber-Nichols Inc. of Arvada, Colo.; Cytec Fiberite of Winona, Minn.; Endevco of San Juan Capistrano, Calif.; Howmet La Porte Casting of La Porte, Ind.; Marotta Scientific Controls Inc. of Montville, N.J.; Summa Technology Inc. of Huntsville; and Thiokol Propulsion, a division of Cordant Technologies Inc. of Salt Lake City, Utah.

The Fastrac engine is an element of the Low Cost Technologies project, part of the Marshall Center's Advanced Space Transportation Program. More information about the Advanced Space Transportation Program is available at the following Web site: http://stp.msfc.nasa.gov

# Hurricane

*Continued from page 1*

tor, Robbie Hood of Marshall's Global Hydrology and Climate Center. "With all of the agencies and the university community working together, we now can learn about these storms from top to bottom — and hopefully improve hurricane prediction."

When a hurricane or tropical storm erupts in the Atlantic, a NASA DC-8 — equipped with instruments to measure the storm's structure, environment and changes in intensity and tracking — will fly into the storm at 35,000-40,000 feet.

At the same time, a specially equipped ER-2 — a high-altitude research plane — will soar above the storm at 65,000 feet. The high-flying plane will measure the storm's structure and the surrounding atmosphere which steers the storm's movement.

On the ground, the storm research team will launch weather balloons and monitor land-based sensors to validate the high-altitude measurements taken by instruments aboard the planes.

Hood and her team plan to fly the NASA planes in conjunction with scheduled storm flights of the National Oceanic and Atmospheric Administration (NOAA), flying out of MacDill Air Force Base in Tampa, Fla., and the "Hurricane Hunters" — the U.S. Air Force's 53rd Weather Reconnaissance Squadron from Keesler Air Force Base in Mississippi.

The "Hurricane Hunters" and NOAA routinely fly into tropical storms and hurricanes to determine the location, motion, strength and size of the storm. The information that the two organizations gather is used to predict the potential strength and size of the storm as well as landfall.

NOAA flies a WP-3 aircraft — a four engine turboprop plane — into storms at altitudes below 27,000 feet. And the "Hurricane Hunters" fly a WC-130 "Hercules" — a four-engine turboprop aircraft — at 5,000-10,000 feet.

"We will analyze the high-altitude storm information within the context of more traditional low-level aircraft observations, and satellite and ground-based radar observations," said Hood. "This new information should provide insight to hurricane modelers — forecasters who continually strive to improve hurricane predictions."

Other GHCC scientists involved with the study are Dr. Richard Blakeslee, Anthony Guillory, Dr. Gary Jedlovec and Dr. Jeffrey Rothermel.

The hurricane study is part of NASA's Earth Science Enterprise to better understand the total Earth system and the effects of natural and human-induced changes on the global environment. More information on the study and research updates can be found on the new Marshall Center Web site location: http://www1.msfc.nasa.gov/NEWSROOM

Courtesy photo

### *First Wing Assembly for X-34 Completes Critical Milestone*

**The first wing assembly for NASA's X-34 technology demonstrator has arrived at Orbital Sciences Corporation, Dulles, Va., and has been mated to the full-scale X-34 test article, seen here. Delivery and integration of the wing assembly with the fuselage marks a major milestone in the program. Flights of the air-launched X-34s are scheduled to begin in 1999 in conjunction with flights of a larger and more advanced sister ship, the X-33. The X-33 and X-34 programs are major assignments of the Space Transportation Programs Office at Marshall.**

## Upcoming Events

### U.S. Rep. Cramer to Speak At Washington Update Luncheon Aug. 24

The Huntsville/Madison County Chamber of Commerce is sponsoring a Washington Update Luncheon with U.S. Rep. Bud Cramer at noon Aug. 24 at the Von Braun Center North Hall. Cramer will discuss issues of vital interest to north Alabama.

Tickets are $20 each and the reservation deadline is Aug. 19. Call Mary Rutledge at 544-5252 for more information.

## Obituary

***Daly, John "Jack" Jr., 78,*** Slidell, La., died June 23. He retired from Michoud Assembly Facility, La., where he worked as chief of Quality and Reliability. He is survived by his wife Virginia Daly.

## Employee Ads

### *Miscellaneous*

★ Aquarium, 55 gal., lights, gravel, filter, $65. 851-6014
★ Mini blinds, various sizes, green, $5 ea.; hanging lamp, $20; 32" storm door, $10. 881-1249
★ Queen sleeper sofa, blue, $450; king headboard w/frame, $50; small truckbed box, $20. 232-5897
★ 2 scooters, $30 ea.; 2-20" bicycles, $40 ea.; Unis 20" folding bicycle, $50. 881-1895
★ Washer/dryer, Sears models, $250, 534-9909 after 6 p.m
★ King wood stove, $50. 971-0048
★ Vinyl floor, 12' x 7' Mannington Silver, white-beige, $150. 882-9417
★ Hungarian hand-painted plates, $30 ea.; Bavarian wrought iron candlestick w/candle, $15. 882-6832
★ Golf club shafts, 7.0, 3-PW, $100. 423-7231
★ Craftsman 12" wood lathe w/mtr and accessories, $290. 881-6962
★ DP exercise bike, heavy duty, full body action, $100 obo. 852-9177
★ Trumpet, King, purchased new in December 1997. 881-5088
★ Sears, 40-gallon, natural gas hot water heater, $200. 858-8513
★ Meridan Norstar phone system, 3 black phone sets; Kenmore washer and Whirlpool dryer, $150 pair. 881-4011
★ Treadmill, $300; black wrought-iron furniture; spool bed, standard size, $100; hide-a-bed sofa, $300. 498-5377
★ Motorcycle/utility trailer, 5' x 9', $475; McKee Craft, 14' fiberglass boat, 50 HP motor, $800. 851-7255
★ Chris Craft cruiser with twin V-8s, $10,000 obo; boathouse also available. 880-0880
★ Vinyl ski vest, Coast Guard approved, $25; ski mirror, windshield mount, meets Alabama law, $55. 883-8257
★ Movie projector, 8mm Chinon, extra bulb, $50; screen, $20. 864-0155

### *Vehicles*

★ 1995 Ford Windstar, $11,000. 859-4156
★ 1990 Toyota pickup, red, 36K miles, 2-wheel drive, records available, $4,300. 881-4748
★ 1987 Oldsmobile Ninety-Eight, $3,000. 859-5814, pager 885-5773
★ 1992 Buick LeSabre, 130K miles. 881-0656
★ 1985 Honda Prelude, automatic, sunroof, alloy wheels, $1,950. 880-7204
★ 1992 Cadillac, Sedan de Ville, blue, 4-door, mag. wheels, 110K miles, leather, $10,500. 586-6413
★ 1985 Ford Escort, blue, 5-speed, A/C, $1,500. 890-6134
★ 1988 Oldsmobile Ninety-Eight Brougham, white, 108K miles, $3,200; 1985 Mercedes, 4-door, 300D, turbo, $6,000. 461-4816
★ 1993 Escort LX, 5-speed, 5-door hatchback, green, air, 78K miles, $6,700 obo. 461-8706
★ 1998 Honda TRX125, four-wheeler, 125 cc, rear rack, $1,500. 830-4846
★ 1974 VW Beetle, restored, $3,000. 498-5377
★ 1992 BMW motorcycle, R100R, 15K miles, $4,500. 726-9101
★ 1995 New Yorker, sport wheels, Infinity stereo, power, 57K miles, plum w/gray interior, $11,700. 880-9025
★ 1986 Buick Ninety-Eight, burgundy, 4-door, A/C, power, $2,500 obo. 859-5814, pager 535-7551
★ 1993 Ford Taurus, 3.8LV6, power seats, windows and locks, A/C, 52K miles, $6,000 obo. 586-2215
★ 1989 Honda LXi, 2-door, A/C, P/D, P/W, cruise, AM/FM/tape, $4,200 obo. 722-8064
★ 1994 Ford truck, XLT, extended cab, V6, 5-speed, 41K miles, bedliner, cover, A/C, $8,700. 881-5034

### *Wanted*

★ Little Tykes log cabin. 971-0048

## Center Announcements

☞ ***Toastmasters* —** The NASA Lunar Nooners Toastmasters Club will meet at 11:30 a.m. Tuesday, Aug. 18, in the Bldg. 4610 cafeteria conference room. All Marshall employees, contractors and friends are invited. **Contact:** Lee Johns, 544-5142

☞ ***MARS Scuba Club* —** The MARS Scuba Club will host a picnic/dive/tune-up class at 11 a.m. Aug. 15 at the Madison Aquatic and Recreational Park. Members and non-members are invited. **Contact:** Andy Brown, 544-1584

☞ ***MOO* —** The Management Operations Office (MOO) retirees will meet for breakfast/lunch at 10 a.m. Aug. 27 (4th Thursday each month) at the Cracker Barrel in Madison. All present or former MOO employees and retirees are invited. **Contact:** 539-0042

☞ ***SMTrends* —** The SMTrends '98 Factory Automation Exhibit continues 9 a.m. - 4 p.m. today at the Von Braun Center. Exhibit activities include technical and hands-on workshops featuring the latest computer automation, SMT manufacturing and repair, robotics, testing and electronic packaging. **Contact:** 881-3569

☞ ***MSAA* —** The Mississippi State Alumni Association (MSAA) is sponsoring an Alumni and Friends Dinner Sept. 3 at Valley Hill Country Club. A social will begin at 6 p.m. with dinner served at 7 p.m. Featured guests include Dr. Malcom Portera, Mississippi State University (MSU) president; Rick Stansbury, MSU head basketball coach; Sharon Fanning, MSU women's head basketball coach; and Baily Howell, MSU All-American and National Basketball Association Hall of Famer. For more information or reservations **contact** Karen Dugard at 830-9065 or Jim Ward at 883-9462.

## Job Opportunities

**CPP 98-95-RE, AST, Electronic Instrumentation Systems, GS-855-14**, S&E, Propulsion Laboratory, Propulsion Test Division, Propulsion Test Measurement Systems Branch. Closing date extended until Aug. 14.

**CPP 98-77-CL, AST, Experimental Facilities Development, GS-801-14**, Facilities Services Office, Engineering & COF Projects Division, Center Operations Directorate. Closes Aug 12.

**CPP 98-108-DC, AST, Measurement & Instrumentation, GS-855-7**, S&E, Astrionics Laboratory, Optics Division. Closes Aug. 18.

**CPP 98-100-CV, AST, Navigation, Guidance, & Control Systems, GS-861-14**, S&E, Structures & Dynamics Laboratory, Guidance & Control Systems Division, Flight Mechanics, Guidance, Navigation, & Control Systems Branch. Closes Aug. 14.

**CPP 98-102-CV, AST, Flight Structures, GS-861-14**, S&E, Structures & Dynamics Laboratory, Structural Design Division, Structural Development Branch. Closes Aug. 14.


# MARSHALL STAR

*Marshall Space Flight Center, Alabama 35812*

The Marshall Star is published every Wednesday by the Internal Relations and Communications Office at the George C. Marshall Space Flight Center, National Aeronautics and Space Administration. Contributions should be submitted no later than Friday noon to the Marshall Internal Relations and Communications Office (CO40), Bldg. 4200. Submissions should be written legibly and include the originator's name. The Marshall Star does not publish commercial advertising of any kind.

Director of Internal Relations
and Communications — Norman Brown
Managing Editor — Angela D. Storey
Writer-Editor — Ann Marie Bryk
**U.S. Government Printing Office 1998-633-111-80022**

BULK RATE
Postage & Fees PAID
**NASA**
Permit No. G-27